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EXAMINER	
KIM, JOHN K	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,555	MADISON, JOEL V.	
	Examiner	Art Unit	
	JOHN K. KIM	2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 September 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5,9,13,15,17 and 19-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5,9,13,15,17 and 19-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *2/10/2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to papers filed on 9/29/2009. Amendments made to the claims and Applicant's remarks have been entered and considered.

Remarks

2. In view of amendments, the Examiner withdraws the rejection under 35 USC 103(a) to claims 1,3,5,7,9,11 and 13-18. However, claims 1, 5, 9, 13, 15, 17 and 19-24 are not in a condition for allowance in view of new ground of rejection. The applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

3. The claims 1, 5, 9, 13, 15 and 17 have been amended. Claims 19-24 have been newly added. Claims 3, 7, 10-12, 14, 16 and 18 have been cancelled. In view of amendment, the examiner reviewed amended claims and remarks as follows.

4. The newly added claims recite method of manufacturing while previous claimed invention refers apparatus. The examiner waived requirement of restriction since the method of manufacturing as claimed recites all limitations as recited in the apparatus (product) claims.

5. Table 1. coefficient of thermal linear expansion

Fact data from http://en.wikipedia.org/wiki/Coefficient_of_thermal_expansion.

coefficient of linear thermal expansion α		coefficient of volumetric thermal expansion β
material	α in 10^{-6}/C° at 20 °C	$\beta(\approx 3\alpha)$ in 10^{-6}/C° at 20 °C
Stainless steel	17.3	51.9
Copper	17	51
Gold	14	42
Nickel	13	39
YbGaGe	0	0[6]
Concrete	12	36
Steel, depends on composition	11.0 ~ 13.0	33.0 ~ 39.0
Iron	11.1	33.3
Carbon steel	10.8	32.4

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Claim 1 refers 'bearing block' but it is not shown in drawings. These items must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1, 5, 9, 13, 15, 17 and 19-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims refer the temperature range of operation being from 70K to 140K, which is from -203 degrees C to -133 degrees C, which is not disclosed in the original specification. It is not sufficiently described in the original specification so that those ordinary skilled in the art would be able to recognize the invention. The examiner regards the temperature range of operation, as claimed, from 70K to 140K, which is from -203 degrees C to -133 degrees C, is same for the generators in prior art and in application.

The claims refer stationary spacer/length compensator/means/spacer composed of material having less than 1% of thermal linear contraction is not disclosed in the original specification. It is not sufficiently described in the original specification so that those ordinary skilled in the art would be able to recognize the invention.

The thrust equalizing mechanism referred in the claims is not disclosed in the original specification to clearly set the definition. Para. 0005 has description as copied below. The examiner regards as recited in claim 1 such that 'the thrust mechanism comprising a thrust plate, variable orifice and fluid chamber, the fluid chamber fluidically coupled to the variable orifice', which is in the applicant admitted prior art.

> The TEMs (Thrust Equalizing Mechanism) mechanisms incorporated in machinery designed by Ebara International Corporation, Sparks, Nev., are good examples of such thrust balancing mechanisms which employ a combination of fixed and variable orifices, but there are limitations with regards to location, length and resultant variable orifice gap size. This invention provides a way for the lower bearing to be disposed closer to the upper bearing, thereby reducing the gap therebetween, without interfering with the thrust balancing mechanism.

Bearing block referred in claim 1 is not disclosed in the original specification to clearly set the definition. The examiner regards a complete bearing which is compact of bearing materials (racers and balls) to serve a purpose of forming shaped. (plane meaning from Webster English dictionary for block)

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim recites "... a stationary spacer composed of material having less than 1% of thermal linear contraction …" but said '1%' is indefinite since what is the condition for the 1% of thermal linear contraction. For the purpose of examination, the examiner regards 1% of thermal linear contraction at temperature change of about 70 degrees C.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 1, 5, 9, 13, 15, 17 and 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (applicant admitted prior art) in view of Traeder (US 3104553) and Brown et al (US 6296765).

As for claim 1, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having main product-lubricated bearings separated by a span of shaft and a thrust equalizing mechanism adjacent one of said main bearings, the lubricated bearings having bearing blocks, the thrust mechanism comprising a thrust plate, variable orifice and fluid chamber, the fluid chamber fluidically coupled to the variable orifice (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary spacer composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator interposed between the thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses (col. 3, line 50-72) a stationary spacer (46) composed of material and that shrinks less than the shaft (22) interposed between the thrust plate (26) and the bearing blocks of its adjacent main bearing (34) to reduce the span between said main bearings (as the element 46 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have a stationary spacer composed of

material and that shrinks less than the shaft of the generator interposed between the thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings by combining the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that the stationary spacer (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary spacer composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 5, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having product-lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings and a variable orifice defined between the thrust plate and a throttle plate affixed to the shaft (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is

operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary length compensator interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses a stationary length compensator (46) interposed between the thrust plate (26) and its adjacent main bearing (34) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 46 is placed to does so), wherein the stationary length compensator (46) is composed of material having thermal linear contraction and that shrinks less than the shaft (22) of the generator (col. 3, line 50-72). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that the stationary length compensator (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary length compensator composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 9, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having product-lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* stationary means interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the Waver stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses stationary means (46) interposed between the thrust plate (26) and its adjacent main bearing (34) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 46 is placed to does so), wherein the stationary means is composed of material having thermal linear contraction and that shrinks less than the shaft of the generator (col. 3, line 50-72). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have stationary means composed of material and that shrinks less than the shaft of the generator interposed between the thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings by combining the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that the stationary means (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses stationary means composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 13, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having main product-lubricated bearings separated by a span of shaft and a thrust equalizing mechanism adjacent one of said main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid pump); *except* an improvement comprising a stationary spacer interposed between the thrust equalizing mechanism and its adjacent main bearing to reduce the span between said main bearings, wherein the spacer is composed o f material having less than 1% o f thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses a stationary spacer (22) interposed between the thrust plate (26) and its adjacent main bearing (34) to reduce the span between said main bearings (as the element 46 is placed to does so), wherein the spacer is composed o f material having thermal linear contraction and that shrinks less than the shaft of the pump (col. 3, line 50-72). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have a stationary spacer interposed between the thrust equalizing mechanism and its adjacent main bearing to reduce the span between said main bearings by combining the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that the stationary means (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses stationary spacer composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 15, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having product- lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings and a variable orifice defined between the thrust plate and a throttle plate affixed to the shaft (preamble of Jepson type claim is considered as an admitted prior art); the height of the a stationary length compensator selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid pump); *except* an improvement comprising a stationary length compensator interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings,

wherein the sp-aver stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses a stationary length compensator (46) interposed between the thrust plate (26) and its adjacent main bearing (34) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 46 is placed to does so), wherein the stationary length compensator is composed of material having thermal linear contraction and that shrinks less than the shaft of the pump (col. 3, line 50-72). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have a stationary length compensator composed of material and that shrinks less than the shaft of the generator interposed between the thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings by combining the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that a stationary length compensator (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary length compensator composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C.

see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 17, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having product- lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid pump); *except* an improvement comprising stationary means interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Traeder shows (in Fig. 2) and discloses stationary means (46) interposed between the thrust plate (26) and its adjacent main bearing (34) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 46 is placed to does so), wherein the stationary means is composed of material having thermal linear contraction and that

shrinks less than the shaft of the pump (col. 3, line 50-72). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Traeder with that of AAPA for predictable results of preventing repositioning or mass shift (col. 1, line 11-12).

Traeder however is silent to show or disclose that the stationary means (46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses stationary means composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Traeder for predictable results of low cost production of rigid spacer since steel is most common material.

With regards to claim 19, the method steps recited are inherently necessitated by the apparatus of claim 1.

With regards to claim 20, the method steps recited are inherently necessitated by the apparatus of claim 5.

With regards to claim 21, the method steps recited are inherently necessitated by the apparatus of claim 9.

With regards to claim 22, the method steps recited are inherently necessitated by the apparatus of claim 13.

With regards to claim 23, the method steps recited are inherently necessitated by the apparatus of claim 15.

With regards to claim 24, the method steps recited are inherently necessitated by the apparatus of claim 17.

Alternative Rejections

14. Claims 1, 5, 9, 13, 15, 17 and 19-24 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (applicant admitted prior art) in view of Yamaguchi et al (US 6119553) and Brown et al (US 6296765).

As for claim 1, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having main product-lubricated bearings separated by a span of shaft and a thrust equalizing mechanism adjacent one of said main bearings, the lubricated bearings having bearing blocks, the thrust mechanism comprising a thrust plate, variable orifice and fluid chamber, the fluid chamber fluidically coupled to the variable orifice (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary spacer composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator interposed between the

thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses a stationary spacer composed of material (16) interposed between the thrust plate (23) and the bearing blocks of its adjacent main bearing (14) to reduce the span between said main bearings (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have a stationary spacer composed of material and that shrinks less than the shaft of the generator interposed between the thrust plate of the thrust equalizing mechanism and the bearing blocks of its adjacent main bearing to reduce the span between said main bearings by combining the teaching of Yamaguchi with that of AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary spacer (44, 46) is composed of material having less than 1% of thermal linear contraction.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary spacer composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 5, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having product-lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings and a variable orifice defined between the thrust plate and a throttle plate affixed to the shaft (preamble of Jepson type claim is considered as an admitted prior art); the height of the spacer selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary length compensator interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses a stationary length compensator (16) interposed between the thrust plate (23) and its adjacent main bearing (14) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Yamaguchi with that of

AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary length compensator composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material and stainless steel is common for shaft.

As for claim 9, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid turbine generator having product-lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the stationary means selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid turbine generator (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising stationary means interposed between the thrust

plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the Waver stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses a stationary means (16) interposed between the thrust plate (23) and its adjacent main bearing (14) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Yamaguchi with that of AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses stationary means composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material and stainless steel is common for shaft.

As for claim 13, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having main product-lubricated bearings separated by a span of shaft and a thrust equalizing mechanism adjacent one of said main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the stationary means selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary spacer interposed between the thrust equalizing mechanism and its adjacent main bearing to reduce the span between said main bearings, wherein the spacer is composed o f material having less than 1% o f thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses a stationary spacer (16) interposed between the thrust equalizing mechanism (23) and its adjacent main bearing (16) to reduce the span between said main bearings (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Yamaguchi with that of AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the generator.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses stationary means composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material.

As for claim 15, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having product-lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings and a variable orifice defined between the thrust plate and a throttle plate affixed to the shaft, (preamble of Jepson type claim is considered as an admitted prior art); the height of the stationary length compensator selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising a stationary length compensator interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary length compensator is composed of material

having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses a stationary length compensator (16) interposed between the thrust plate (23) and its adjacent main bearing (14) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Yamaguchi with that of AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary length compensator composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material and stainless steel is common for shaft.

As for claim 17, AAPA shows (in Figs. 1-2) and discloses a vertical flow cryogenic liquid pump having product- lubricated main bearings separated by a span of shaft and a thrust equalizing mechanism which includes a stationary thrust plate adjacent one of the main bearings (preamble of Jepson type claim is considered as an admitted prior art); the height of the stationary means selected such that it is operative between 70 K and 140 K, the operating temperature range of the cryogenic liquid pump (since AAPA shows the same cryogenic liquid turbine generator); *except* an improvement comprising stationary means interposed between the thrust plate and its adjacent main bearing to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Yamaguchi shows (in Fig. 1) and discloses stationary means (16) interposed between the thrust plate (23) and its adjacent main bearing (14) to space said adjacent main bearing from the thrust plate in order to reduce the span between said main bearings, wherein the stationary means is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump (as the element 16 is placed to does so). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Yamaguchi with that of AAPA for predictable result of securely defining the outer races of bearings (col. 5, line 24-27).

Yamaguchi however is silent to show or disclose that the stationary length compensator is composed of material having less than 1% of thermal linear contraction and that shrinks less than the shaft of the pump.

In the same field of endeavor, Brown shows (in Fig. 1) and discloses a stationary length compensator composed of material (16) having less than 1% of thermal linear contraction (0.077~0.091 % since it is made of steel which has 11~13e-6 /C), and that shrinks less than the shaft (since shaft is made of stainless steel which has 17.3e-6 /C. see table 1). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teaching of Brown with that of AAPA in view of Yamaguchi for predictable results of low cost production of rigid spacer since steel is most common material and stainless steel is common for shaft.

With regards to claim 19, the method steps recited are inherently necessitated by the apparatus of claim 1.

With regards to claim 20, the method steps recited are inherently necessitated by the apparatus of claim 5.

With regards to claim 21, the method steps recited are inherently necessitated by the apparatus of claim 9.

With regards to claim 22, the method steps recited are inherently necessitated by the apparatus of claim 13.

With regards to claim 23, the method steps recited are inherently necessitated by the apparatus of claim 15.

With regards to claim 24, the method steps recited are inherently necessitated by the apparatus of claim 17.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN K. KIM whose telephone number is (571)270-5072. The fax phone number for the examiner where this application or proceeding is assigned is 571-270-6072. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached on 571-272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/
Supervisory Patent Examiner, Art Unit 2834

JK